has once been obtained and the pupil is able to think in another language than his own, the analysis and study of the idiom should be carried on in the light of comparative philology. He should be taught to see that the apparently arbitrary phenomena of language are all subject to strict law, and that the forms and words he uses all have a history and a reason for being what they are. In this way his intelligence as well as his memory will be excited and quickened, his curiosity, that "fountain-head of science," will be legitimately aroused and satisfied, and above all the conception of law will be made familiar to him from the first beginning of his education. When the action of philological laws has been traced and illustrated in modern languages, it will be easy to pass on to the dead ones and show how they are but the earlier forms of living speech, past links in the great chain of unbroken development.

Before parting from Miss Otté, allusion must be made to the reformed spelling of Dano-Norwegian and Swedish, which she has adopted in her Manual, and of which she has given an interesting account in her Introduction. This reformed spelling is in the first instance due to Rask, the great Danish philologist, but it owes its present acceptance to the Stockholm Conference, called together in 1869 by the exertions of Prof. Daa, and to the Dano-Norwegian dictionary which was the result of it. The vicious spelling of the past has now been superseded by a consistent and fairly phonetic one, based upon a scientific alphabet. In this respect the Danes have set us an example which it would be well to follow. The "practical men" of Scandinavia have at last condescended to listen to the recommendations of those who study language scientifically, and the people consequently now possess an orthography which forms no hindrance to learning to read and write and throws no veil over the true nature of speech. Let the Englishman who uses Miss Otté's Manual try to put himself in the place of a Dane who wishes to learn English, and then consider whether he does all in his power to facilitate the acquisition of at all events one language by the foreigner. A. H. SAYCE

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Spectrum of Brorsen's Comet

I AM much obliged to Mr. Christie for his answer to my question. There can remain no doubt that Brorsen's comet does not *now* give the same spectrum as, according to Huggins's observations, it did in 1868. The difference in position between the brightest lines in the two spectra of carbon is, it is true, very small, but if it were possible it would be a step gained to decide which of the two lines the brightest comet band coincides with, 5198·4 or 5165·5, since as far as experimental evidence goes at present one of these lines is due to carbon-vapour and the other to an oxide of carbon. I fear that Prof. Piazzi Symth's theory that the spectrum in question is caused by hydrocarbon must be rejected for experimental reasons which I will presently recapitulate. I have had no experience in comet-spectroscopy, not having access to any telescope of sufficient aperture, and I do not wish, therefore, to seem to make light of the achievement of Mr. Christie and Prof. Young; but if it were possible to adjust the occulting bar so as to *completely* hide (but only *just* hide) the least refrangible edge of the brightest comet-band, then I should imagine that, on flashing in the spectrum of the alcohol-tube, its band would be seen beyond the bar if the comet-spectrum be, as is most probable, that which I have called "Carbon No. I."

At present the observations at the Royal Observatory seem to point to a coincidence with the second spectrum, but it was the *first* which Prof. Young employed and which Prof. Huggins also employed. A reference to Prof. Huggins's account of his experiments shows that the comparison-spectrum was obtained by taking the electric spark in olefiant gas at the ordinary pressure; and he further observes (*Quart. Jour. Science*, April, 1869) that "the same spectrum is given by the spark in cyanogen."

The difference between the spark in olefiant gas and in olive oil, shown in Huggins's diagram, is simply one of detail—the separate lines being distinctly seen in the spectrum of the oil and not in that of the gas.

Prof. Piazzi Smyth's alcohol-tube seems to differ from Mr. Christie's in containing besides the lines of spectrum No. II. (if he will allow me to call it so) the green band seen in the blue base of a candle flame—that is the band beginning with 5165·5.

This, I believe, is always the case if the vapour be at a somewhat high pressure. A reference to the *Phil. Trans.* for 1865, or the *Phil. Mag.* for October, 1869, will show that the tubes with which Plücker worked contained lines of both spectra—and that he did not succeed in completely separating the two. But a tube containing pure carbonic oxide at a small pressure (one or two millimetres) shows no trace of this green band even "end-on."

I cannot accept Prof. Piazzi Smyth's theory that this green band and the remainder of the lines in spectrum No. I. are due to hydrocarbon, for the simple reason that they are obtained brilliantly from substances which do not contain hydrogen, viz., cyanogen, carbonic oxide, and sulphide of carbon.

There is no more magnificent spectrum than the "carbon spectrum No. I.," obtained by burning cyanogen and oxygen together at the nozzle of an oxyhydrogen blow-pipe.

I should like to refer Prof. Smyth for other arguments than my own and for experimental evidence to a paper to be found in the *Ann. Ch. Phys.* for 1865, t. 4, p. 305.

Giggleswick, May 27 WILLIAM MARSHALL WATTS

A Universal Catalogue

THE last April number of NATURE contains an article on a Universal Catalogue, which seems to be still under discussion.

So great a work, when undertaken, should to a certain extent be complete, so as not to necessitate the same thing having to be done fifty times. With a really universal catalogue of books and memoirs existing, it would be quite easy for each library to form its own catalogue in a much abbreviated form. For instance:—

Brewster, Optics. 1831. P. 2350, or

Hauy, Crist. et Propr. phys. Enclase. 1819. Min. 6430,

would be quite sufficient to stand for—

Brewster, Treatise on Optics. London, 1831. Catalogue of Physical Science Papers, 2350. and

Hauy, Mémoire sur la Cristallisation et sur les Propriétés physiques de l'Enclase, Paris, Mus. Hist. Nat. Mém. v. 1819, pp. 278-293. Catalogue of Mineralogical Papers, 6430.

So in the library catalogues no cross references and main titles would be necessary, and no double and treble lines for titles of books or memoirs, five or six words and two numbers being sufficient to characterise each publication, while now, there being no general catalogue, each library desiring to give its catalogue—an undertaking which is highly desirable—is obliged to spend disproportionate cost, time, and space for such a purpose.

But scientific workmen would also be much better served in this way, as may be shown by the following facts:—

Putting the whole number of titles in the British Museum catalogue at 3,750,000 (1,250,000 real ones, 2,500,000 cross references, &c.), they may be classed into old and modern works, the former 750,000, the latter 3,000,000. Now, putting the number of special branches which deserve and imperatively demand special catalogues of subjects—as mathematics, botany, statistics, &c., &c.—at 50, and supposing that old books extend even 15 to 20 branches each, every special branch is represented by $\frac{750000}{50} \cdot 20 = 300{,}000$ titles of old publications and $\frac{3000000}{50} = 60{,}000$ of new ones.

So, one seeking for books of a single branch does not find

more than 360,000 titles among 3,750,000, filling, when printed alone, 4·32, or in round numbers, 5 volumes of the 45, while he must undergo the trouble of using all the 45, or of this work, $\frac{40}{45}$, *i.e.*, 89 per cent. is useless and annoying for him, and $\frac{5}{45}$, or 11 per cent. only is useful; the space needed for the catalogue is about 4 metres, 44 centimetres of which are useful, and 3m. 56cm. disturbing; and, last but not least, he pays 36*l.* instead of 4*l.*

But with all this superfluous work, still no complete catalogue is acquired, but a very deficient one; for of periodical journal articles there are about 3,000,000, separate works about 6,000,000 in a rough estimation, or together, 9,000,000, *i.e.* (no main titles or cross-references being herein comprised), about six times the number possessed by the British Museum library.

Supposing, in the same proportion as above, these 9 millions of publications to be accompanied by 12 millions of main titles, &c.; supposing, then, these 21 millions of entries to be composed of 4·2 millions of old and 16·8 millions of new ones, the publication of these could be effected as follows:—

The titles of old books, being used much seldomer than new ones, and belonging mostly to fifteen to twenty different branches, could form a special catalogue of fifty volumes, whose price would be 40*l.*; each great city might content itself with a single copy accessible to all men of science.

The remaining 16·8 millions of modern publication titles, divided into fifty branches, would give 360,000 entries for each of them, or *five volumes for* 4*l.*, so that even private libraries would be enabled to possess a complete catalogue of all modern publications of a single branch.

As to the construction of such catalogues, the following would perhaps be a practical method:—

At first a committee for the defining of branches and the limit between old and modern publications should be appointed, to which all greater libraries should send copies of their catalogue classifications; by means of these copies exact rules for the extent of branches and the method of working could be drawn up in six months.

This work done, a numerous catalogue committee should be formed, to which all greater library catalogues should be sent in copies; where such copies are wanting the library should be examined by members of the committee, using the thitherto ready part of the catalogues.

The periodical publications before 1800 and after 1873, should be registered in the same manner as those in the "Royal Society Catalogue," and then subdivided into single branches by the committee. In this way complete catalogues for great groups could be formed, care being taken not to restrict the limits of these too much in order to hasten the publication of the work. This publication would be the first and hardest step to a manageable index of literature.

During the next ten years after its publication the completion could be carried out by putting beside each title a short classification of its contents, not an extract—contained in a single word or phrase, like "electrostat." or "relat. age mortal.," for "electrostatics" or "relation between age and mortality," or a few single words when different matters are treated; these classifications, made simultaneously by different persons and compared, together with all corrections, could be printed about twelve years after the first catalogue, and form the final work, which at short intervals of five or ten years should be completed by appendices.

ARISTIDES BREZINA
Custos of the Imperial Mineralogical Museum, Vienna

Distribution of Mus rattus

I AM able to-day to complete my note in NATURE, vol. xx. p. 29, as to the exact habitat of the black rat in Thuringia. Prof. Liebe, of Gera, kindly wrote to me that it occurs in East Thuringia and the Voigtland in single elevated side-valleys of the rivers Weisse Elster and Roda, as well as in single lurking-places of the Frankenwald. Here it occurs in isolated forest-houses, in the valleys, in whole partly large villages, for instance, St. Gangloff. In this place for a long time past *Mus rattus* and *M. decumanus* have occurred together among each other, not one above the other, on different floors, as might be supposed, though *rattus* now and then rather prefers the upper floors, and the latter does not appear to be decreasing in number. In those villages about three specimens of *rattus* are always killed for one specimen of *decumanus*, the latter, apparently, being less numerous.

A. B. MEYER
Dresden, Royal Zoological Museum, May 20

Insect Galls Buds

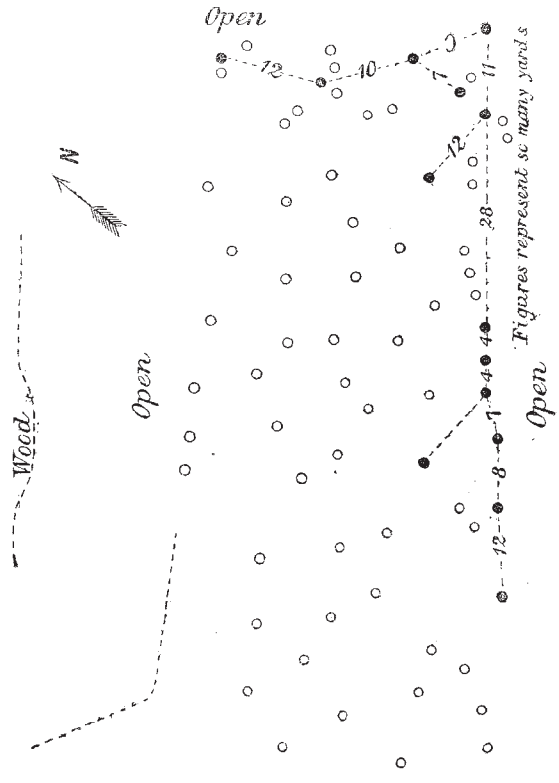
I WAS much interested in Mr. A. Stephen Wilson's letter upon this subject (NATURE, vol. xx. p. 55). I must, however, demur to his statement that "all insect-galls are in reality leaf-buds or fruit-buds," as too sweeping to be accurate. I can hardly include in the above category the numerous galls which make their appearance on the growing leaves of trees, such, for example, as the oak-spangles (of *Neuroterus malpighii*) or the galls of the *Spathegaster baccarum*, *Andricus curvator*, &c., several of which may be placed on the veins of a single leaf. These examples cannot assuredly be classed as pathologically developed leaf or fruit *buds* only so far as woody growth usually takes place through buds. In a short paper I once read at the Linnean Society, an abstract of which appeared in NATURE during the early part of the year 1875, I drew attention to the fact that the growth of galls took place coincidently with the growth of the tissues in which they were placed; thus the development of the bud-galls of *Cynips kolleri*, *Teras terminalis*, and *Aphilothrix gemmæ*, is to be seen in the spring, summer, and early autumn, but not in winter time when the tree growth is arrested. My observations at that time led me to suppose that the currant galls of the oak and others of the same class only grow during the growth of the leaf to which they were attached.

I trust Mr. Wilson will give your readers the benefit of his further researches on this subject.

W. AINSLIE HOLLIS
Brighton, May 16

Effects of Lightning

A REMARKABLE electric discharge occurred on Sir Robert Gordon's estate of Letterfourie in a small wood about four miles to the south-east of this place on November 16 last about 12.45 A.M. The accompanying sketch (scale $\frac{1}{24}$" = one yard), where



the trees (common fir and larch) *struck* are represented by black dots, will give you an idea. The soil and trees were slightly covered with snow, which had been falling at intervals since sunset on the 15th. On that night I observed two or three flashes of lightning accompanied by thunder, and a few days afterwards